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Copper Carbonate for Wheat Smut Control

A New Dusting Method of Treating Seed Wheat Now Under Trial

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The use of powdered copper carbonate for treating wheat in place of the old standard method of dipping in liquid formaldehyde or bluestone (copper sulfate) solution was first developed in Australia. It was tested first in the United States in 1920 by the California Experiment Station. The results were so promising that the tests have been continued in that state and also in other Pacific Coast states.

Preliminary Tests Encouraging

In the fall of 1921 statewide tests were started in Oregon by various county agents under the direction of the Experiment Station pathologist. Records of about a hundred such tests have been turned in, and the results are so satisfactory in general that the Experiment Station is encouraging more extensive testing of this method this fall. The results in other Coast states are likewise encouraging. Universal adoption of this method will not be advocated until the results of further tests fully confirm the apparent advantages of the dust treatment.

Not Advisable for Oats and Barley

Experience in other states indicates that the copper carbonate treatment will not be satisfactory for oats or barley, since the surface of the seed is covered with a hull which prevents actual contact of the dust with the seed.

Advantages of Copper Carbonate

The usual formaldehyde or bluestone treatment generally causes some damage to the seed and also reduces the promptness of germination and vigor of the seedlings to an appreciable extent, particularly when the soil temperature and moisture conditions do not favor quick germination and when the seed coats of the grain are injured by threshing, as is usually the case in Oregon where the grain is exceedingly dry and brittle at threshing time. This injury is increased as a rule where the grain is not planted promptly after treatment. To lose thirty to forty percent or more of the stand from liquid-treatment injury, is not uncommon. The use of the lime bath after the bluestone treatment will reduce to a considerable extent the bluestone injury but does not ordinarily eliminate it entirely.

Copper carbonate causes no injury to seed or seedlings. It can be applied months ahead, if desired, with no effect on the seed during storage. In other words, copper-carbonate-treated seed appears to give perfect stands. The grain comes up more promptly and shows, as a rule, greater vigor than with liquid treatment.

Copper carbonate thoroughly dusted over the surface of the kernels appears nearly if not quite to equal the liquid methods of treating wheat in the matter of smut control unless the seed is very conspicuously dirty from smut or the smut balls have not been properly removed by careful fanning.

Copper carbonate does not have very much effect in preventing infection from smut-contaminated soil. Neither do the liquid methods. This must be remembered in conducting tests since much summer fallow is contaminated by the smut blowing over onto it from threshing operations.

Copper carbonate is worth a test on your farm alongside the grain treated as usual.

Directions

Use Only a Good Grade of Copper Carbonate. Some inferior copper carbonate is on the market. It has a low copper content. It may be cheaper, but the results in smut control with such materials have been unsatisfactory. Get your material from a reliable dealer who will guarantee the copper carbonate to be at least 85 to 90 percent pure or containing not less than 47 to 50 percent of metallic copper. Material of 95 percent purity is desirable if it can be obtained.

Amount of Copper Carbonate. Two ounces per bushel of wheat, if thoroughly applied, is sufficient. Merely putting the seed on a canvas or in a box, adding the powder and shoveling it over repeatedly will *not* give good results. Much of the dust drops to the bottom and never gets where it should.

Cleaning the Seed. Before being treated the seed should be run through a fanning mill until practically clean of smut balls, dust, and trash. Very smutty wheat should never be used for seed.

Mixing Machine. Success with the dust method depends on the complete covering of every kernel with the powder so that even the brush and crease are filled. In order to bring this to pass it is necessary to

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COPPER CARBONATE POISONING. Severe illness often results from the inhaling of copper carbonate dust. The effects are usually temporary but may cause great distress while they last. Grain should never be treated in a closed room. The operator should set up the treating and sacking apparatus so that the wind will carry the dust away from him. The best protection is afforded by a respirator worn over nose and mouth to exclude the dust. Some efficient device of this kind should always be worn if there is much treating to be done.

USE 3 OUNCES PER BUSHEL. where the seed wheat is visibly smutty. Recent tests at the Corvallis Station show that with most of the good grade copper carbonate three ounces or more can be applied without waste and tests at the Washington Station show that with grain that is visibly darkened with smut, better smut control is obtained with three ounces than with two ounces, which was formerly considered the correct standard application.

STANDARD OF QUALITY. As a result of extensive tests the California Experiment Station has established the following standard of quality for copper carbonate:

1. Copper content not less than 50% by weight.
2. Fineness such that 95% will pass through a 200 mesh sieve.
3. Fluffiness such that one cubic foot will weigh not over 32 pounds.

TREATING MACHINES. Many growers have found the small type of concrete mixer to be very satisfactory for dusting wheat. Tight covers can usually be fitted over the openings of the mixing chamber to reduce the escape of the dust. There are now on the market several types of machines adapted to continuous operation. These take the wheat direct from the fanning mill and discharge it well-covered with dust into sacks. As far as we know only three companies are now engaged in making such machines in the Northwest:

The Calkins Machine Company, Spokane, Washington.
The Walla Walla Iron Works, Walla Walla, Washington.
The Washington Machinery Company, Spokane, Washington.

NOTICE: The law requires all copper carbonate sold in Oregon to be registered by the State Experiment Station.

put the grain into some kind of closed container with the proper amount of copper carbonate where it can be churned or raised up and spilled over and over with the powder until every grain is covered.

The simplest kind of effective mixing device is like a rotary churn or a cylinder that can be rotated by hand or by a small engine. The cylinder should have projecting blades or cleats attached to the interior so as to pick up the grain as it is rotated and let it fall again. When the mixing is completed the grain is simply dumped out into sacks and is ready for seeding at once, or it may be stored for future planting.

Time Required. The treating chamber should not be filled too full, permitting abundant movement of the seed when rotated. At the rate of 20 to 30 revolutions per minute it should be sufficient to rotate the cylinder for two minutes. This is the estimate given by the Washington Experiment Station based on tests. Do not expect the best results unless the mixing of seed and dust is perfect.

Rate to Seed. Dusted grain is not swollen like grain treated with a liquid solution. Furthermore copper carbonate does not cut down germination as liquid treatment frequently does. As a result it is necessary to reduce the amount of seed used per acre. Sow at least a peck per acre less than required when seeding grain treated with liquid. The exact amount of seed to give the best results can be determined only by test, and such tests should be made by the grower if possible.

Putting on a Test

A field test is a comparison of the different methods tried side by side. The same lot of seed should be used for the dust and for the usual liquid treatment. The seed should be planted the same day, in the same field, with the same drill, at the same depth, side by side, and the division line marked. Record should be kept of the rate of seeding in each case and of the exact method and time of treatment. The field should be watched carefully. Notes should be kept on the time the grain appeared above ground, in each case, on the character of the stand, the height and vigor of the plants, etc. Then, as the grain approaches maturity, notes should be made of any differences in appearance, and repeated counts should be made at different points in each plot to determine the number of heads in a given distance in the drill row and the percent of smut heads among them. If desired, records can be made of comparative yields at harvest. The Experiment Station would be glad to get a copy of the record of any carefully conducted test. This will help in determining the worth of this new method of smut treatment for the State as a whole.